a light source that provides a beam of light through said aperture so as to optically stimulate said optically sensitive device to exercise said integrated circuit;

wherein said probe card extends across a diameter of a wafer containing multiple integrated circuits thereon and wherein said power source connection of the probe card comprises a power source layer that is connected to a power source contact pad on each of the integrated circuits during exercising of the integrated circuits, wherein said ground connection of the probe card comprises a ground layer that is connected to a ground contact pad on each of the integrated circuits during exercising of the integrated circuits, and wherein said probe card includes multiple apertures that extend through said probe card and are aligned with corresponding ones of an optically sensitive device of each of the integrated circuits during exercising of the integrated circuits.

REMARKS

This amendment responds to an Office Action dated January 22, 2003, in the above-identified patent application. Claims 1-17 were filed in the original application, and are currently pending.

By this response, Applicant has amended claims 1-13 and 15-17. Claims 1-17 are under consideration in the application, of which claims 1, 11 and 17 are in independent form. This Response is being filed within three

months of the Office Action outstanding. No additional claim fees or time extension fees are required.

In the Office Action dated January 22, 2003, the Examiner rejects claims 10 and 15-16 under 35 USC 112, second paragraph, as allegedly being indefinite. Regarding claim 10, the Examiner states that it is unclear how the power source layer, an insulation layer and a ground layer are related to the step of optically stimulating the optically sensitive device. Applicant has amended claim 10 to depend from claim 9. Applicant believes claim 10 as amended conforms to 35 USC 112, second paragraph, and Applicant respectfully requests the Examiner to withdraw the rejection of claim 10 under 35 USC 112, second paragraph.

Regarding claim 15, the Examiner states that it is unclear how a light control signal, a multi-filter mask, a light channel controller, a fiber optic block, a heating device and a temperature control device are interrelated and associated with each other. Applicant has amended claim 15 to recite the relationship and association of the recited elements with each other. Accordingly, Applicant believes the rejection of claim 15 has been overcome and Applicant respectfully requests the Examiner with withdraw the rejection of claim 15 under 35 USC 112, second paragraph.

Regarding claim 16, the Examiner states that it is unclear how a parabolic reflector, a liquid crystal display panel, a wavelength filter, a computer, a fiber optic bundle, and a heating coil are interrelated and associated with each other. Applicant has amended claims 16 and 15 (from which claim 16 depends) to recite the relationship and association of the recited elements with each other. Accordingly, Applicant believes the rejection of claim 16 has been overcome and Applicant respectfully requests

the Examiner with withdraw the rejection of claim 16 under 35 USC 112, second paragraph.

As there are no other objections to claims 10 and 15-16 Applicant respectfully requests allowance of these claims as amended.

In the Office Action dated January 22, 2003, the Examiner rejects claims 1, 4-9 and 11-14 under 35 USC 103(a) as allegedly being unpatentable over Spaziani (US Patent No. 5,631,571, hereinafter "Spaziani").

By this response, independent claims 1 and 11 have been amended: Claim 1 has been amended to recite "simultaneously connecting each of the plurality of integrated circuits to an electrical source; and simultaneously optically stimulating said optically sensitive devices so as to allow current to flow through said optically sensitive devices from said electrical source to said components so as to exercise said components". Claim 11 has been amended to recite "a probe card including: . . . a plurality of apertures that extend through said probe card and that are aligned with an optically sensitive device on each of said integrated circuits during exercising of the integrated circuits; and a light source that provides a beam of light through said apertures so as to optically stimulate said optically sensitive devices to exercise said integrated circuits."

Spaziani does not teach or suggest "simultaneously optically stimulating [multiple] optically sensitive devices" as recited in Applicant's claim 1, or "a probe card [having] a plurality of apertures [and] a light source that provides a beam of light through said apertures so as to optically stimulate said optically sensitive devices to exercise said integrated circuits" as recited in Applicant's claim 11. Spaziani does not even address exercising of integrated circuit devices. Moreover, Spaziani does not address exercising

integrated circuit devices by utilizing an optical signal to allow current to flow to the components being exercised. In contrast to Applicant's invention, Spaziani teaches providing an optical fiber to a single device. ("The invention provides such means by allowing **a testing path optical fiber** to be guided and positioned over **a device-under-test** with great accuracy and yet with a satisfactory degree of repeatability and permanence" column 4, lines 31-34; and, "Optical communication with **the tested device** . . ." column 5, lines 48-49). As shown in FIG. 2, optical communication element 114 is only positioned over, and therefore only optically stimulates, **one optical port 203**. Moreover, Spaziani teaches away from optically stimulating more than one device at a time by stating "Since many of the devices-under-test have an active area of about 50 micrometers by 50 micrometers a large fiber, as shown at 244 in FIG. 2b, may unnecessarily disperse the output energy of the optical signal element 122 and thereby be undesirable." (Column 7, lines 7-13). Due to Spaziani's use of only a single optical fiber, there is no need for, and Spaziani therefore teaches away from, a probe card that blocks portions of the wafer from optical stimulation in regions where testing is not being conducted or in regions where optical illumination is not desired.

Spaziani does not teach or suggest Applicant's method or apparatus for simultaneously exercising a plurality of components by simultaneously optically stimulating a plurality of optical devices connected thereto. Spaziani even teaches away from such a method and apparatus by teaching an optical fiber sized to be positioned over a single device. For these reasons Applicant believes independent claims 1 and 11 as amended, and corresponding dependent claims 4-9 and 12-14, are allowable under 35 USC 103(a) and Applicant respectfully requests allowance of the same.

In the Office Action dated January 22, 2003, the Examiner rejects claims 1-4 and 8 under 35 USC 103(a) as allegedly being unpatentable over Ridgeway (US Patent No. 4,770,483, hereinafter "Ridgeway").

By this response, as recited above, independent claim 1 has been amended to recite "simultaneously connecting each of the plurality of integrated circuits to an electrical source; and simultaneously optically stimulating said optically sensitive devices so as to allow current to flow through said optically sensitive devices from said electrical source to said components so as to exercise said components".

Ridgeway does not teach or suggest "simultaneously optically stimulating [multiple] optically sensitive devices" as recited in Applicant's claim 1. Ridgeway does not even address **exercising** of integrated circuit devices, or utilizing an optical signal to allow current to flow to multiple components being exercised. In contrast to Applicant's invention, Ridgeway teaches modulating an optical signal to **a single "photodetector 33"** (column 20, line 39; and FIG. 10) **so as to detect and analyze the optical signal itself** (Abstract). As recited in the Field of the Invention section, Ridgeway is concerned with analyzing a single, intensity modulated optical signal not with stimulating multiple optical devices to simultaneously exercise multiple components of integrated circuits.

Ridgeway does not teach or suggest Applicant's method for simultaneously exercising a plurality of components by simultaneously optically stimulating a plurality of optical devices connected thereto. Ridgeway's method of providing a single optical signal to a single photodector device would not function to exercise a plurality of components on a plurality of integrated circuits as recited in Applicant's claim 1 as amended. For these reasons Applicant believes independent claim 1 as amended, and

corresponding dependent claims 2-4 and 8, are allowable under 35 USC 103(a) and Applicant respectfully requests allowance of the same.

In the Office Action dated January 22, 2003, the Examiner indicated claim 17 as being objected to as dependent upon a rejected base claim but states that the claim would be allowable if rewritten in independent form. By this response Applicant has rewritten claim 17 in independent form including all of the limitations of the base claim and any intervening claims. Accordingly, Applicant believes claim 17 is in condition for allowance and Applicant respectfully requests the same.

Applicant respectfully requests entry of this Amendment and reconsideration of the application as amended.

Respectfully submitted,

Date: April 22, 2003

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Appendix A

The present pages 14-19 of the present Response indicate the changes to the claims made herein in application Serial Number 09/526,955, filed March 16, 2000

Deleted material is indicated in brackets [ ] and added material is shown underlined.

1. (First Amended) A method of exercising [a] components on [an] integrated circuits, comprising the steps of:

providing [an] a plurality of integrated circuits each having an optically sensitive device and a component wherein said optically sensitive device is electrically connected to said component;

simultaneously connecting each of the plurality of integrated circuits to an electrical source; and

simultaneously optically stimulating said optically sensitive devices so as to allow current to flow through said optically sensitive devices from said electrical source to said components so as to exercise said components.

2. (First Amended) The method of claim 1 wherein said electrical source is a power source and wherein said current flow is a positive current flow to said components.

3. (First Amended) The method of claim 1 wherein said electrical source is an electrical ground and wherein said current flow is a negative current flow to said components.

4. (First Amended) The method of claim 1 wherein said optically sensitive devices are [is a] diodes.

5. (First Amended) The method of claim 1 wherein the step of optically stimulating said optically sensitive devices comprises providing a probe card having [an] a plurality of apertures therein, aligning said apertures with ones of said optically sensitive devices, and providing a source

light beam through said apertures to optically stimulate said optically sensitive devices.

6. (First Amended) The method of claim 1 wherein the step of optically stimulating said optically sensitive devices comprises providing a filter mask, and activating said filter mask for a predetermined time period to allow passage of a light beam through said filter mask to optically stimulate said optically sensitive devices for said predetermined time period.

7. (First Amended) The method of claim 1 wherein the step of providing [an] a plurality of integrated circuits comprises providing a wafer having [a] said plurality of integrated circuits thereon.

8. (First Amended) The method of claim 1 wherein the step of optically stimulating said optically sensitive devices comprises providing a fiber optic bundle having individual strands therein, aligning [at least a] selected ones of said individual strands with ones of said optically sensitive devices, and providing a light beam through said [at least a] selected ones of said individual strands to optically stimulate ones of said optically sensitive devices.

9. (First Amended) The method of claim 1 wherein the step of connecting the integrated circuits to an electrical source comprises providing a probe card having an electrical lead connected at a first end to said electrical source and connected at a second end to [an] a plurality of electrically conductive bumps, and connecting said electrically conductive bumps to ones of said integrated circuits.

10. (First Amended) The method of claim [1] 9 wherein [the step of optically stimulating said optically sensitive devices comprises providing a] said probe card [having] includes multiple layers therein including a power source layer connected to said electrical lead, an insulation layer and a ground layer positioned opposite said insulation layer from said power source layer and connected to an electrical ground, and wherein said probe card further includes [an] a plurality of apertures that each extend[s] through said multiple layers so as to allow the passage of light through said probe card to said integrated circuits.

11. (First Amended) A device for exercising [a] components on [an] a plurality of integrated circuits, comprising:

a probe card including:

a power source connection electrically connected to an outside power source and electrically connected to a power source contact pad on [the] each of a plurality of integrated circuits during exercising of the integrated circuits;

a ground connection electrically connected to an outside electrical ground and electrically connected to a ground contact pad on each of the plurality of integrated circuits during exercising of the integrated circuits;

[an] a plurality of apertures that extend[s] through said probe card and that [is] are aligned with an optically sensitive device on each of said integrated circuits during exercising of the integrated circuits; and

a light source that provides a beam of light through said apertures so as to optically stimulate said optically sensitive devices to exercise said integrated circuits.

12. (First Amended) The device of claim 11 further comprising a filter mask that allows passage of said beam of light through said [filter mask] apertures for a predetermined time period to optically stimulate said optically sensitive devices for said predetermined time period.

13. (First Amended) The device of claim 11 further comprising a fiber optic bundle having individual strands therein, wherein [at least a] selected ones of said individual strands [is] are aligned with said apertures, and wherein said [at least a] selected ones of said individual strands transmit[s] said beam of light from said light source to said apertures.

15. (First Amended) The device of claim 11 further comprising a burn-in chamber containing said probe card and said light source, and further comprising a light control signal for controlling said light source, a multi-filter mask for filtering said light, a light channel controller for controlling said light from said light source, a fiber optic block for transmitting said light from said light source to said probe card, a heating device for heating said integrated circuits, and a temperature control device for controlling said heating device.

16. (First Amended) The device of claim 15 wherein said burn-in chamber further comprises a parabolic reflector for directing said

light to said probe card, said light control signal comprises a liquid crystal display panel, said multi-filter mask comprises at least one wavelength filter, said light channel controller comprises a computer, said fiber optic block comprises a fiber optic bundle, said heating device comprises heating coils, and said temperature control device comprises an anodized aluminum plate connected to a thermostat.

17. (First Amended) A device for exercising a component on an integrated circuit, comprising:

a probe card including:

a power source connection electrically connected to an outside power source and electrically connected to a power source contact pad on the integrated circuit during exercising of the integrated circuit;

a ground connection electrically connected to an outside electrical ground and electrically connected to a ground contact pad on the integrated circuit during exercising of the integrated circuit;

an aperture that extends through said probe card and that is aligned with an optically sensitive device on said integrated circuit during exercising of the integrated circuit; and

a light source that provides a beam of light through said aperture so as to optically stimulate said optically sensitive device to exercise said integrated circuit;

[The device of claim 11] wherein said probe card extends across a diameter of a wafer containing multiple integrated circuits thereon and wherein said power source connection of the probe card comprises a power source layer that is connected to a power source contact pad on each of the integrated circuits during exercising of the integrated circuits, wherein said

ground connection of the probe card comprises a ground layer that is connected to a ground contact pad on each of the integrated circuits during exercising of the integrated circuits, and wherein said probe card includes multiple apertures that extend through said probe card and are aligned with corresponding ones of an optically sensitive device of each of the integrated circuits during exercising of the integrated circuits.

Appendix B

Pages 21-25 of the present Response indicate the Full Set of Pending Claims currently pending in application Serial Number 09/526,955, filed March 16, 2000

1. (First Amended) A method of exercising components on integrated circuits, comprising the steps of:

providing a plurality of integrated circuits each having an optically sensitive device and a component wherein said optically sensitive device is electrically connected to said component;

simultaneously connecting each of the plurality of integrated circuits to an electrical source; and

simultaneously optically stimulating said optically sensitive devices so as to allow current to flow through said optically sensitive devices from said electrical source to said components so as to exercise said components.

2. (First Amended) The method of claim 1 wherein said electrical source is a power source and wherein said current flow is a positive current flow to said components.

3. (First Amended) The method of claim 1 wherein said electrical source is an electrical ground and wherein said current flow is a negative current flow to said components.

4. (First Amended) The method of claim 1 wherein said optically sensitive devices are diodes.

5. (First Amended) The method of claim 1 wherein the step of optically stimulating said optically sensitive devices comprises providing a probe card having a plurality of apertures therein, aligning said apertures with ones of said optically sensitive devices, and providing a source light beam through said apertures to optically stimulate said optically sensitive devices.

6. (First Amended) The method of claim 1 wherein the step of optically stimulating said optically sensitive devices comprises providing a

filter mask, and activating said filter mask for a predetermined time period to allow passage of a light beam through said filter mask to optically stimulate said optically sensitive devices for said predetermined time period.

7. (First Amended) The method of claim 1 wherein the step of providing a plurality of integrated circuits comprises providing a wafer having said plurality of integrated circuits thereon.

8. (First Amended) The method of claim 1 wherein the step of optically stimulating said optically sensitive devices comprises providing a fiber optic bundle having individual strands therein, aligning selected ones of said individual strands with ones of said optically sensitive devices, and providing a light beam through said selected ones of said individual strands to optically stimulate ones of said optically sensitive devices.

9. (First Amended) The method of claim 1 wherein the step of connecting the integrated circuits to an electrical source comprises providing a probe card having an electrical lead connected at a first end to said electrical source and connected at a second end to a plurality of electrically conductive bumps, and connecting said electrically conductive bumps to ones of said integrated circuits.

10. (First Amended) The method of claim 9 wherein said probe card includes multiple layers therein including a power source layer connected to said electrical lead, an insulation layer and a ground layer positioned opposite said insulation layer from said power source layer and connected to an electrical ground, and wherein said probe card further includes a plurality of apertures that each extend through said multiple layers so as to allow the passage of light through said probe card to said integrated circuits.

11. (First Amended) A device for exercising components on a plurality of integrated circuits, comprising:

a probe card including:

a power source connection electrically connected to an outside power source and electrically connected to a power source contact pad on each of a plurality of integrated circuits during exercising of the integrated circuits;

a ground connection electrically connected to an outside electrical ground and electrically connected to a ground contact pad on each of the plurality of integrated circuits during exercising of the integrated circuits;

a plurality of apertures that extend through said probe card and that are aligned with an optically sensitive device on each of said integrated circuits during exercising of the integrated circuits; and

a light source that provides a beam of light through said apertures so as to optically stimulate said optically sensitive devices to exercise said integrated circuits.

12. (First Amended) The device of claim 11 further comprising a filter mask that allows passage of said beam of light through said apertures for a predetermined time period to optically stimulate said optically sensitive devices for said predetermined time period.

13. (First Amended) The device of claim 11 further comprising a fiber optic bundle having individual strands therein, wherein selected ones of said individual strands are aligned with said apertures, and wherein said selected ones of said individual strands transmit said beam of light from said light source to said apertures.

14. The device of claim 11 wherein said light source is chosen from the group consisting of a light bulb, multiple light bulbs, a laser, multiple lasers, and a liquid crystal display panel.

15. (First Amended) The device of claim 11 further comprising a burn-in chamber containing said probe card and said light source, and further comprising a light control signal for controlling said light source, a multi-filter mask for filtering said light, a light channel controller for controlling said light from said light source, a fiber optic block for transmitting said light from said light source to said probe card, a heating device for heating said integrated circuits, and a temperature control device for controlling said heating device.

16. (First Amended) The device of claim 15 wherein said burn-in chamber further comprises a parabolic reflector for directing said light to said probe card, said light control signal comprises a liquid crystal display panel, said multi-filter mask comprises at least one wavelength filter, said light channel controller comprises a computer, said fiber optic block comprises a fiber optic bundle, said heating device comprises heating coils, and said temperature control device comprises an anodized aluminum plate connected to a thermostat.

17. (First Amended) A device for exercising a component on an integrated circuit, comprising:

a probe card including:

a power source connection electrically connected to an outside power source and electrically connected to a power source contact pad on the integrated circuit during exercising of the integrated circuit;

a ground connection electrically connected to an outside electrical ground and electrically connected to a ground contact pad on the integrated circuit during exercising of the integrated circuit;

an aperture that extends through said probe card and that is aligned with an optically sensitive device on said integrated circuit during exercising of the integrated circuit; and

a light source that provides a beam of light through said aperture so as to optically stimulate said optically sensitive device to exercise said integrated circuit; wherein said probe card extends across a diameter of a wafer containing multiple integrated circuits thereon and wherein said power source connection of the probe card comprises a power source layer that is connected to a power source contact pad on each of the integrated circuits during exercising of the integrated circuits, wherein said ground connection of the probe card comprises a ground layer that is connected to a ground contact pad on each of the integrated circuits during exercising of the integrated circuits, and wherein said probe card includes multiple apertures that extend through said probe card and are aligned with corresponding ones of an optically sensitive device of each of the integrated circuits during exercising of the integrated circuits.